In the Claims:

Cancel claims 70, 77, 90 - 92, 98, 99, 103, 104, 111, 115 - 119, 121, 130, and131, without prejudice, amend claims 69, 71, 76 - 81, 84, 86, 87 - 89, 97, 105 , 106, 110, 112 - 114, 120 - 124, 126, and 127, and add new claims 134 - 142 as indicated below:

1. (Cancelled)

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3. (Cancelled)

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64. (Cancelled)

65. (Cancelled)

66. (Cancelled)

67. (Cancelled)

68. (Cancelled)

69. (Amended) A lightning detection system, comprising:

a source of an electrical detection signal representative of an electromagnetic field from a lightning flash comprising a series of lightning discharges;

an analog-to-digital converter, responsive to said electrical detection signal, for producing a digital detection signal representative of said electromagnetic field; and

a digital processor, responsive to said digital detection signal, for determining the type of at least one of said lightning discharges that produced said electromagnetic field based on characteristics of said digital detection signal, said digital processor continually processing said digital detection signal so as to eliminate dead time between said lightning ~~events~~ discharges.

70. (Cancelled)

71. (Amended) The lightning detection ~~signal~~ system of claim ~~70~~ 69, further comprising a non-linear amplifier, responsive to said ~~conditioned~~ electrical detection signal, for producing an

amplitude compressed ~~conditioned~~ electrical detection signal having a reduced dynamic amplitude range prior to application to said analog-to-digital converter.

72. (Previously presented) The lightning detection system of claim 71, wherein said non-linear amplifier is a logarithmic amplifier.

73. (Previously presented) The lightning detection system of claim 71, wherein said non-linear amplifier is a piece-wise linear amplifier.

74. (Previously presented) The lightning detection system of claim 69, wherein said digital processor employs said digital detection signal representative of said electromagnetic field to identify maxima and minima of the waveform of said digital detection signal, and identifies zero crossings of said digital detection signal.

75. (Previously presented) The lightning detection system of claim 74, wherein said digital processor distinguishes between cloud-to-ground and intra-cloud lightning discharges.

76. (Amended) The lightning detection system of claim 69, wherein said digital processor produces digital data characterizing said series of lightning discharges derived from said digital detection signal, and said system further comprises a data transmission component for transmitting said ~~characterizing~~ digital data over a communications channel.

77. (Cancelled)

78. (Amended) The lightning detection system of claim ~~77~~ 76,wherein said transmission component includes a data compression component for reducing the amount of said digital data ~~needed to characterize a lightning discharge~~ so as to decrease the time or bandwidth required to transmit a ~~complete data set representative of a series of lightning discharges~~ said digital data.

79. (Amended) The lightning detection system of claim 78, wherein said data compression component minimally transmits, for ~~each~~ said series of discharges, a sufficient ~~characterizing~~ quantity of said digital data to identify the amplitude of the largest pulse produced thereby and the time when said largest pulse occurred.

80. (Amended) The lightning detection system of claim ~~78~~ 76, comprising a plurality of sources at different locations, wherein said data ~~compression~~ transmission component includes a data decimation component for synchronously decimating said ~~characterizing~~ digital data when needed to accommodate the bandwidth of said communications channel.

81. (Amended) The lightning detection system of claim 69, further comprising a non-linear amplifier, responsive to said ~~source of an~~ electrical detection signal, for producing an amplitude compressed electrical detection signal having a reduced amplitude dynamic range for application to said analog-to-digital converter for converting said amplitude compressed electrical detection signal to a corresponding digital detection signal.

82. (Previously presented) The lightning detection system of claim 81, wherein said non-linear amplifier is a logarithmic amplifier.

83. (Previously presented) The lightning detection system of claim 81, wherein said non-linear amplifier is a piece-wise linear amplifier.

84. (Amended) The lightning detection system of claim 81, wherein said digital processor employs said ~~amplitude compressed~~ digital detection signal ~~representative of said electromagnetic field~~ to identify maxima and minima of the waveform of said amplitude compressed digital detection signal, and identifies zero crossings of said ~~amplitude compressed~~ digital detection signal.

85. (Previously presented) The lightning detection system of claim 84, wherein said digital processor distinguishes between cloud-to-ground and intra-cloud lightning discharges.

86. (Amended) The lightning detection system of claim 81, wherein said ~~signal~~ digital processor produces digital data characterizing said series of lightning discharges ~~that are identified~~ derived from said digital detection signal, and said system further comprises a data transmission component for transmitting said ~~characterizing~~ digital data over a communications channel.

87. (Amended) The lightning detection system of claim ~~86~~ 90, wherein said transmission component includes a data compression component for reducing the amount of said digital data ~~needed to characterize a lightning discharge~~ so as to decrease the time or bandwidth required to transmit ~~a complete data set representative of a series of lightning discharges~~ said digital data over said communications channel.

88. (Amended) The lightning detection system of claim 87, wherein said data compression component minimally transmits, for ~~each~~ said series of discharges, a sufficient quantity of said digital data to identify the amplitude of the largest pulse produced thereby and the time when said largest pulse occurred.

89. (Amended) The lightning detection system of claim ~~87~~ 86, comprising a plurality of sources at different locations, wherein said data ~~compression~~ transmission component further comprises a data decimation component for synchronously decimating said ~~characterizing~~ digital data when needed to accommodate the bandwidth of said communications channel.

90. (Cancelled)

91. (Cancelled)

92. (Cancelled)

93. (Previously presented) The lightning detection system of claim 69, further comprising a circuit for producing, as said electrical detection signal, a signal representative of the derivative of said electromagnetic field.

94. (Amended) The lightning detection system of claim 93, further comprising an amplifier, responsive to said electrical detection signal, for producing an amplitude compressed electrical detection signal having a reducing the dynamic amplitude range ~~of said electrical detection signal prior to its~~ for application to said analog-to-digital converter for converting said amplitude compressed electrical detection signal to a corresponding digital detection signal.

95. (Previously presented) The lightning detection system of claim 94, wherein said amplifier is a logarithmic amplifier.

96. (Previously presented) The lightning detection system of claim 95, wherein said amplifier is a piece-wise linear amplifier.

97. (Amended) The lightning detection system of claim 93, wherein said digital processor includes an integration element for digitally integrating said digital detection signal and thereby producing an integrated digital detection signal, said processor using both said digital detection signal representative of the derivative of said electromagnetic field and said integrated digital detection signal to determine the type of said at least one of said lightning discharges ~~that produced said electromagnetic field~~.

98. (Cancelled)

99. (Cancelled)

100. (Previously presented) The lightning detection system of claim 97, wherein said digital processor employs said digital detection signal representative of the derivative of said electromagnetic field to identify maxima and minima of the waveform of said integrated digital detection signal, and identifies zero crossings of said integrated digital detection signal from said integrated digital detection signal itself.

101. (Previously presented) The lightning detection system of claim 100, wherein said digital processor distinguishes between cloud-to-ground and intra-cloud lightning discharges.

102. (Previously presented) A method for detecting lightning, comprising:

producing in response to an electromagnetic field from a lightning flash comprising a series of lightning discharges an electrical detection signal representative of said electromagnetic field;

producing, in response to said electrical detection signal, a digital detection signal representative of said electromagnetic field; and

determining the type of at least one of said lightning discharges that produced said electromagnetic field based on characteristics of said digital detection signal while continually processing said digital detection signal so as to eliminate dead time between said lightning ~~events~~ discharges.

103. (Cancelled)

104. (Cancelled)

105. (Amended) The lightning detection method of claim ~~103~~ 102, further comprising producing from said electrical detection signal an amplitude compressed ~~conditioned~~ electrical detection signal having a reduced amplitude dynamic range prior to producing said digital detection signal.

106. (Amended) The lightning detection method of claim 105, wherein said amplitude compressed ~~conditioned~~ electrical signal is produced by logarithmic amplification.

107. (Amended) The lightning detection method of claim 105, wherein said amplitude compressed ~~conditioned~~ electrical signal is produced by piece-wise linear amplification.

108. (Previously presented) The lightning detection method of claim 102, further comprising identifying maxima and minima and zero crossings of said digital detection signal.

109. (Previously presented) The lightning detection method of claim 108, further comprising distinguishing between cloud-to-ground and intra-cloud lightning discharges based on said maxima and minima and zero crossings.

110. (Amended) The lightning detection method of claim 102, wherein said determining the type of said at least one lightning discharge includes deriving ~~producing~~ digital data ~~characterizing lightning discharges that are identified~~ from said digital detection signal, and said method further comprises transmitting said ~~characterizing~~ digital data over a communications channel.

111. (Cancelled)

112. (Amended) The lightning detection method of claim ~~111~~ 110, wherein said transmitting includes reducing the amount of said digital data ~~needed to characterize a lightning discharge~~ so as to decrease the time or bandwidth required to transmit ~~a complete data set representative of a series of lightning discharges~~ said digital data over said communications channel.

113. (Amended) The lightning detection method of claim 112, further comprising minimally transmitting, for ~~each~~ said series of discharges, a sufficient quantity of said digital data to identify the amplitude of the largest pulse in said ~~characterizing~~ digital data and the time when said largest pulse occurred.

114. (Amended) The lightning detection method of claim ~~112~~ 110, comprising producing a plurality of electrical detection signals from sources at different locations and further comprising synchronously decimating said ~~characterizing~~ digital data where needed to accommodate the bandwidth of said communications channel.

115. (Cancelled)

116. (Cancelled)

117. (Cancelled)

118. (Cancelled)

119. (Cancelled)

120. (Amended) The lightning detection method of claim ~~115~~ 102, further comprising producing ~~from said~~ an amplitude compressed electrical detection signal ~~digital data characterizing lightning discharges that are identified~~ having a reduced amplitude dynamic range prior to producing said digital detection signal ~~and transmitting as said characterizing data over a communications channel~~.

121. (Cancelled)

122. (Amended) The lightning detection method of claim ~~121~~ 138, further comprising reducing the amount of said digital data ~~needed to characterize a series of lightning discharges~~ so as to

decrease the time or bandwidth required to transmit said ~~characterizing~~ digital data ~~a complete data set representative of a series of lightning discharges~~ over said communications channel.

123. (Amended) The lightning detection method of claim 122, further comprising minimally transmitting, for ~~each~~ said series of discharges a sufficient quantity of said digital data to identify the amplitude of the largest pulse ~~in said characterizing data~~ produced thereby and the time when said largest pulse occurred.

124. (Amended) The lightning detection method of claim ~~122~~ 138, comprising producing a plurality of electrical detection signals from sources at different locations and further comprising synchronously decimating said ~~characterizing~~ digital data when needed to accommodate the bandwidth of said communications channel.

125. (Previously presented) The lightning detection method of claim 102, wherein said electrical detection signal represents the derivative of said electromagnetic field.

126. (Amended) The lightning detection method of claim 125, further comprising digitally integrating said digital detection signal and thereby producing an integrated digital detection signal, and using both said digital detection signal representative of the derivative of said electromagnetic field and said integrated digital detection signal to determine the type of said at least one of said lightning discharges ~~that produced said electromagnetic field~~.

127. (Amended) The lightning detection method of claim ~~126~~ 125, further comprising amplifying said electrical detection signal so as to reduce the dynamic amplitude range of said electrical detection signal prior to producing said digital detection signal.

128. (Previously presented) The lightning detection method of claim 127, wherein said amplifying is accomplished by logarithmic amplification.

129. (Previously presented) The lightning detection method of claim 127, wherein said amplifying is accomplished by piece-wise linear amplification.

130. (Cancelled)

131. (Cancelled)

132. (Previously presented) The lightning detection method of claim 126, further comprising using said digital detection signal representative of the derivative of said electromagnetic field to identify maxima and minima of the waveform of said integrated digital detection signal, and identifying zero crossings of said integrated digital detection signal from said integrated digital detection signal.

133. (Previously presented) The lightning detection method of claim 132, further comprising distinguishing between cloud-to-ground and intra-cloud lightning discharges.

134. (new) The method of claim 120, further comprising logarithmically amplifying said electrical detection signal to produce said amplitude compressed electrical detection signal.

135. (new) The method of claim 120, further comprising piece-wise linearly amplifying said electrical detection signal to produce said amplitude compressed electrical detection signal.

136. (new) The method of claim 120, further comprising identifying maxima and minima of said digital detection signal and identifying zero crossings of said digital detection signal.

137. (new) The method of claim 136, further comprising distinguishing between cloud-to-ground and intra-cloud lightning discharges.

138. (new) The method of claim 120, further comprising deriving digital data from said digital detection signal, and transmitting said digital data over a communications channel.

139. (new) The method of claim 102, further comprising compressing the dynamic range of said electrical detection signal prior to producing said digital detection signal.

140. (new) The method of claim 139, further comprising reversing said step of compressing the dynamic range of said electrical detection signal in the digital domain.

141. (new) The lightning detection system of claim 69, further comprising a compression circuit for dynamic range compression of said electrical detection signal prior to application thereof to said analog-to-digital converter.

142. (new) The lightning detection system of claim 141, wherein said digital processor is adapted for operating on said digital detection signal to reverse the dynamic range compression produced by said analog compression module.